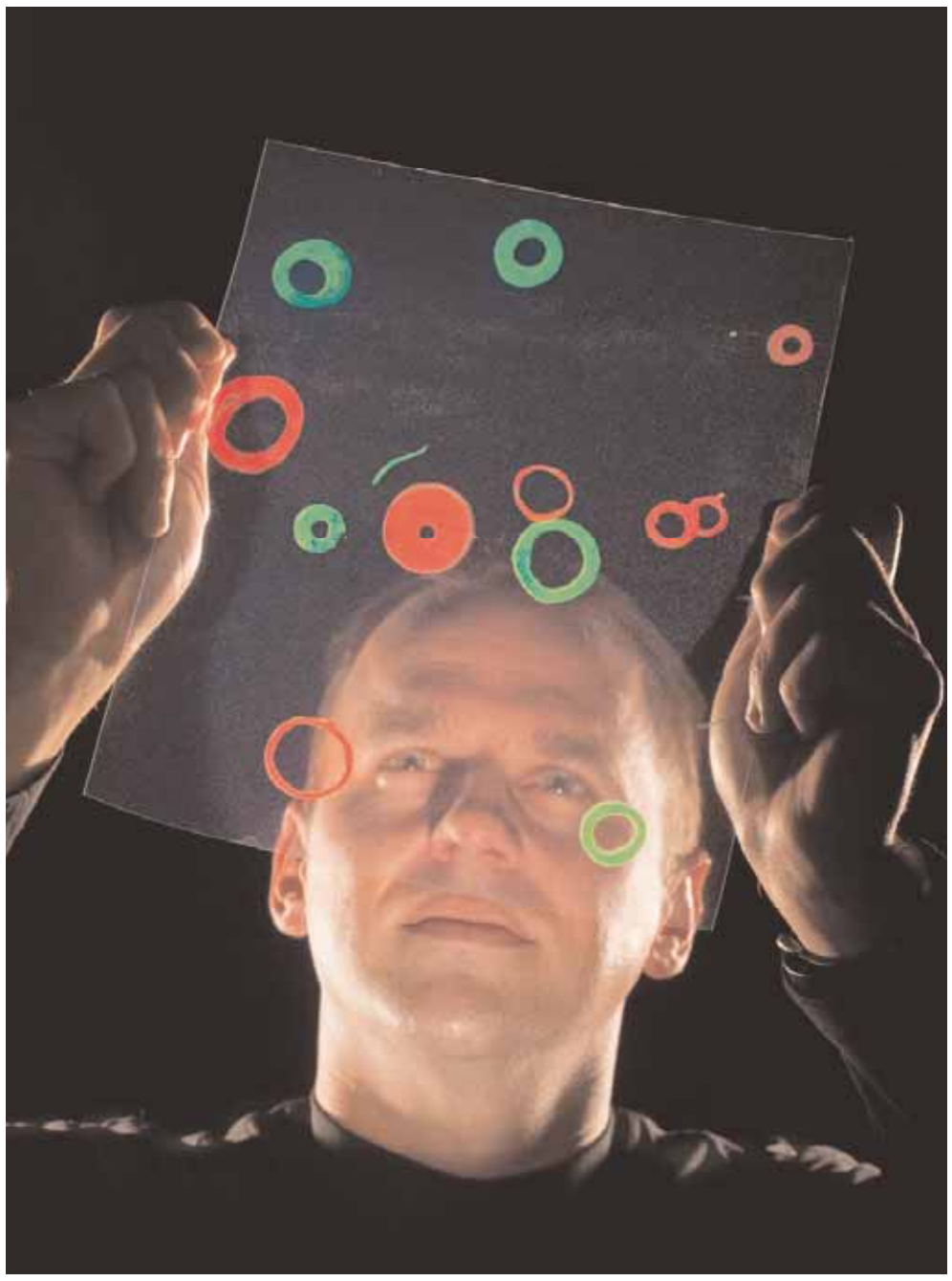

Research points way toward chameleon-like camouflage

By Neal Singer

Certain fish species blend with their environment by changing color like chameleons. Their tiny motor proteins carry skin pigment crystals in their "tails" as they walk with their "feet" along the microtubule skeletons of cells to rearrange the animal's color display.

In two recent papers, Sandia researchers have demonstrated that, in theory, they could produce a similar color change to enable synthetic or hybrid materials to change color like fish do.

"Military camouflage outfits that blend with a variety of environments without need of an outside power source — blue, say, when at sea, and then brown in a desert environment — is where this work could eventually lead," says principal investigator George Bachand (1132). "Or the same effect could be used in fabricating chic civilian clothing that automatically changes color to fit different visual settings."

> *"Military camouflage outfits that blend with a variety of environments without need of an outside power source — blue, say, when at sea, and then brown in a desert environment — is where this work could eventually lead."*
>
> **— Principal investigator George Bachand**

The power source for both the biological and the lab method relies on the basic cellular fuel called ATP, which releases energy as it breaks down. Fifty percent (roughly) is absorbed by the motor proteins.

(Continued on page 4)

IN LIVING COLOR — George Bachand examines an enlargement of actual images of light-emitting quantum dots riding microtubules that have spontaneously formed stable circles of about 5 microns diameter. The picture superimposes two separate images — one of green rings and one of red — for visual effect. The images were processed to remove noise and maximize contrast. (Photo by Randy Montoya)

Sandia LabNews

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Sandia National Laboratories

Managed by Lockheed Martin for the National Nuclear Security Administration

Sandia planning several events to celebrate 60th anniversary

By Chris Miller

Sandia this year plans to roll out the red carpet at events from California to New Mexico to Washington, D.C., to celebrate its 60 years as a separate nuclear weapons/national security laboratory.

Although Sandia began as a part of the Los Alamos laboratory during the Manhattan Project, its extraordinary journey as an independent lab began with President Harry Truman's May 13, 1949, letter to Leroy Wilson, president of the American Telephone and Telegraph Company. Truman asked AT&T to manage Sandia under a contract from the Atomic Energy Commission. "In my opinion you have here an opportunity to render an exceptional service in the national interest," Truman wrote. On Nov. 1, 1949, the request became reality.

"Sandia has a proud and rich history of serving the nation and the events we've lined up are designed to celebrate that history as well as to promote a sense of our culture and tradition that will inspire our newer employees," says David Keese (12150), chairman of the 60th anniversary team. "It's also an opportunity to increase the Labs' visibility and reputation with key constituencies, from the communities where we live and work to Congress and key agencies in Washington."

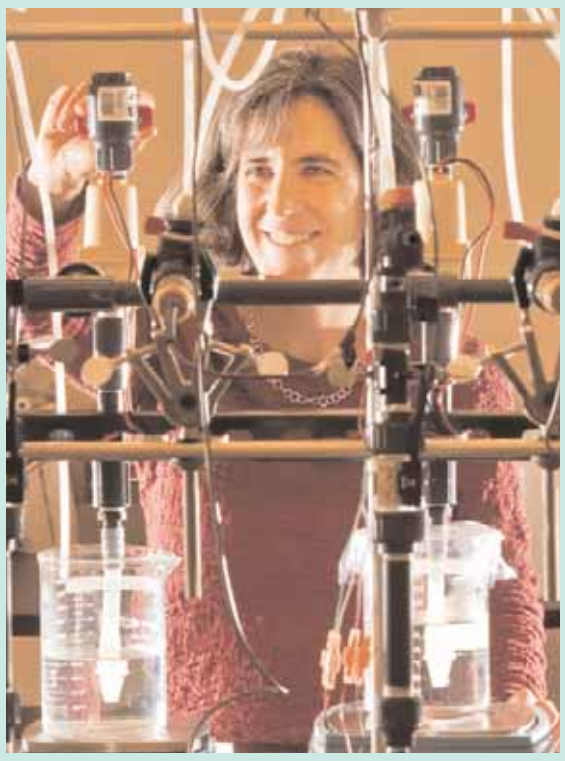
A website with information about Sandia's 60th anniversary activities is under development and will be live soon. Planning for the activities is ongoing and includes:

• A traveling exhibit that highlights Sandia's technological and programmatic accomplishments, including micromachines, high-performance computing, and stockpile stewardship. It will be displayed for the first time this month in the first-floor lobby of Bldg. 802. The exhibit will also appear at various locations, including the new home of the National Museum of Nuclear Science and History near Sandia, Sandia/California, the DOE Forrestal Building in Washington, D.C., and the new US Capitol Visitor Center.

(Continued on page 5)

Family Day 2009 is May 16

Recently conducted research suggests that Family Day 2009, set for Albuquerque Saturday, May 16, very likely will be a gathering of some 12,000-16,000 folks. Read the latest in a story on **page 5.**



Desalination potential

Treating brackish water for human consumption "can be done and be done affordably" here in New Mexico and other parts of the country, says Sandia water researcher Mike Hightower (6332). Read more on **page 6.**

Also inside . . .

That's that

Did you see that story in the news a few weeks back about the satellites that collided? In case you missed it, on Feb. 10, a commercial Iridium communications satellite collided with a defunct Russian Cosmos communications relay satellite about 500 miles above northern Siberia. US STRATCOM, which tracks objects in space, estimates that the collision added about 600 pieces of trackable debris to the growing accumulation of space junk in Earth orbit. With 18,000 objects of four inches or more in diameter currently being tracked by STRATCOM, the chance of collision is something that can no longer be discounted as remote.

As this incident has demonstrated, the debris from a major collision — these were both big satellites — gets spread out in all directions. It's almost certain that some of the debris from this incident has been thrown into an orbit that crosses the orbit of the International Space Station. While mission experts consider the chance of a collision between the Space Station and this debris field to be low, the fact is, the episode certainly focuses the mind.

And I wonder . . . Is this growing problem something that Sandia can address? Any ideas out there about clearing the spaceways?

* * *

It's an ill wind that blows no good . . . and that's just as true on Mars as it is here at home. When the winds get up on Mars, they can kick up dust storms that tend to cover the solar panels on NASA's two remarkable rovers, Spirit and Opportunity. That, in turn, obviously reduces the amount of discretionary energy available to the rovers. But what the winds blow in they can also blow out . . . or off. And that's what happened last month: A fair wind scoured Spirit's solar panels enough to enable the rover to drive for up to an hour and a half a day, rather than the 50 minutes it had lately been reduced to. This isn't the first time the Martian winds have provided this cleaning service, by the way. Thanks to brilliant engineering and some lucky breaks, both rovers have now logged more than five years on missions that were expected to last three months. Of course, as legendary baseball executive Branch Rickey said: "Luck is the residue of design."

* * *

In tribute to Paul Harvey, the radio veteran who passed away last month, here's something from the mailbag (he always said that): Got an email from an individual who's invented a machine that — and I quote — "produces energy, works without any fuel and depends on the gravity." This machine, the writer continues, "produces high energy - new source of renewable energy sources - a new industrial revolution - works every where on earth - cars, trains, ships, and factories can work with it." The writer claims he has gained international protection for his invention from the Patent Cooperation Treaty and says he can send the idea and designs.

This all sounds very, very good to me, but not being a technical expert I feel I'm a bit out of my league on this one. If anyone wants to follow up on this, I can put you in touch with the writer. But consider this fair notice: If anything comes of it, I feel I'm entitled to a share of the profits.

* * *

What do you think of Daylight Saving Time? A correspondent (who works at Sandia) sent me a note making a pretty good case that DST not only doesn't save energy — its purported purpose — but actually *wastes* energy. I did a little checking and discovered that there is a case to be made on either side of the argument. So again I ask: What do you think? Let me know and I'll pass it along in an upcoming column.

See you next time.

— Bill Murphy (505-845-0845, MS0165, wtmurph@sandia.gov)

Sandia is No. 1 — again — in the community

Labs' 2008 ECP contributions reach $3.78 million

By Iris Aboytes

It's official. Sandia contributed $3.78 million to the United Way of Central New Mexico. Sandia has been the No. 1 giver to United Way since its inception, more than 50 years ago.

ED RIVERA, new president of United Way of Central New Mexico.

The total was announced recently at the yearly celebration. As a whole the 2008 campaign total was more than $25 million. The 2007 total was $23.15 million.

Bernalillo, Sandoval, Torrance, and Valencia counties make up the United Way of Central New Mexico.

Intel Corp.'s total contribution for 2008 was $3.27 million, which includes a dollar-for-dollar company match. Presbyterian Healthcare Services came in at $1.47 million. The University of New Mexico for the first time ever joined the Million Dollar Roundtable with more than $1 million donated.

The celebration highlighted retiring president and CEO of the United Way of Central New Mexico Jack Holmes. Holmes has been the president since 1997. He and his wife Frances will be on a humanitarian mission in Moscow, Russia, for 23 months starting in May. He said he was grateful to the community for welcoming him, for being so committed to helping their neighbors through United Way, and for giving him an opportunity to serve.

Ed Rivera was introduced as the new president. Rivera comes to Albuquerque from Kittleman and Associates in Chicago, an executive search firm for nonprofit organizations.

Rivera served as the founding president of the Cancer Treatment Research Foundation, a national organization pioneering translational and nutritional research in oncology.

"I am thrilled to be in central New Mexico," says Rivera. "The innovations and success of this United Way and the engagement of the community members are what made me want to lead this great organization. With everyone's continued support we will build into the future on our past achievements."

Judges sought for Intel ISEF 2009

Judges are still needed for the 2009 Intel International Science and Engineering Fair (ISEF), to be held May 10-16, in Reno, Nev.

This week-long event is the world's largest precollege celebration of science and engineering. The fair brings together approximately 1,500 high school students from all 50 states and more than 50 foreign countries, regions, and territories to compete for more than $4 million in scholarships, tuition grants, internships, scientific field trips, and three grand prizes of $50,000 college scholarships.

GATHERING GENIUS
INTEL ISEF 2009 · RENO, NEVADA

Major universities, government agencies, military branches, and businesses come to recruit from the best pool of future scientists in the world.

A number of student scientists from New Mexico will compete in Reno and several Nobel Prize winners will address both students and judges.

Len Duda (5715) and Ted Wolff (3652) are serving as judge cochairs for Physics and Astronomy and Animal Science, respectively, and are recruiting judges for these categories. However, prospective judges can sign up for any of the fair's 17 scientific disciplines where they have a particular expertise and interest.

If you are interested in becoming a Grand Awards judge at the 2009 Intel ISEF in Reno, sign up at: www.ISEFNevada.com/judge.php

Grand Awards judges will need to be available on site the afternoon of Tuesday, May 12, and all day Wednesday, May 13.

Due to the extensive fund-raising required to host a fair, funds do not exist to cover the travel and lodging expenses of the approximately 1,200 judges needed. During the judging process, a lunch and dinner are provided for judges on both Tuesday and Wednesday. In addition, a breakfast is provided on Wednesday morning and a judge's social will be provided Wednesday evening.

Sandia LabNews

Sandia National Laboratories

http://www.sandia.gov/LabNews

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Sandia drives innovation with transportation energy hub

HITEC venture aims to accelerate technical innovation in low-carbon transportation

By Mike Janes

Recognizing the need for new energy solutions in the transportation sector that balance climate, security, and sustainability, Sandia has launched a new, Labs-wide venture aimed at filling this void through large-scale public-private partnerships with an array of domestic and international research institutions and programs.

Known as the Hub for Innovation in the Transportation Energy Community (HITEC), the effort will focus on vehicle engine efficiency, vehicle electrification, and low-carbon alternative fuels, all with an underpinning of systems analysis. The new initiative is led by Transportation Energy Center 8300 Director Bob Carling and his deputy Andy McIlroy, who are identifying potential industry, national laboratory, and university partners via personal contacts and state, national, and international conferences and events.

"[O]ne of HITEC's objectives will be to produce viable, real-world transportation energy solutions . . ."

— Bob Carling (8300)

"We're aggressively reaching out to the private sector and other entities that can join HITEC and help bridge the gaps between research, policy, and the marketplace for transportation energy," says Andy.

Bob says HITEC, with the Combustion Research Facility (CRF) as its core, is being developed in parallel with the National Energy Innovation Initiative (NEII), spearheaded by Terry Michalske (6100). Other members of the HITEC senior management team include Bob Hwang (1130), Justine Johannes (1811), Cara Johnson (2540), John Merson (6310), Pat Falcone (8110), Denise Koker (8520), and Art Pontau (8360). Still, even as Sandia leads the effort, Bob says HITEC won't necessarily be "owned" or directed by Sandia. Those responsibilities, he says, will be shared with HITEC partners.

First steps

In January, members of the HITEC team, largely composed of staff members in the business development support group (8529), actively participated in a series of overseas conferences and meetings with a variety of international companies and potential HITEC partners, including BP Alternative Energy, Ricardo, and Lotus Engineering. In addition, Sandia and HITEC served as sponsors at a recent transportation energy conference organized by CALSTART (a California-based organization dedicated to supporting and accelerating the growth of the advanced transportation technologies industry and its related markets). Groups like CALSTART could help broker even more key relationships, especially with companies in the state of California.

In addition to the outreach to industry, HITEC team members Bruce Balfour, Jill Micheau, Craig Smith, and Carrie Burchard (all 8529) have been researching other public-private partnership models that successfully mirror HITEC. Bruce and Jill, for instance, visited the Science and Enterprise Park at Loughborough University in Loughborough, UK, and met with the management of the Energy Technologies Institute (ETI) and Cenex, the UK's Centre of Excellence for Low Carbon and Fuel Cell Technologies. Their hosts, Bruce said, proved very helpful in explaining the inner workings of ETI's organizational structures and lessons learned in running an industry-driven public-private partnership.

R&D — and D

While Sandia tends to be very adept at traditional research and development, Bob says HITEC aims to add another D — demonstration — to the familiar "R&D."

"Much like a recent General Motors project — which entailed science-based engineering and demonstration of a hydrogen fuel system — one of HITEC's objectives will be to produce viable, real-world transportation energy solutions that can bridge the gap between research labs and commercial products," says Bob.

"HITEC partners will include US and international transportation companies, energy firms, research organizations, and universities, as well as other DOE laboratories," says Bob. The first order of business, he points out, is to identify representatives from a group of flagship partners who will form the basis of a steering committee. That team, Bob says, will help select the specific areas of research on which HITEC will focus, develop a workable funding structure, and help guide other hub decisions and priorities. Though no partners have yet committed to the venture, letters of support have been signed by several entities, and follow-up meetings are planned with several potential partners.

'Open campus' and other synergies

In the future, facilities and space for HITEC could come into play as the Livermore Valley's "Open Campus" begins to come to fruition. Sandia and Lawrence Livermore Lab are creating the campus, which will allow greater international scientific engagement, enable closer interaction with industry and academia, and spur local economic development by providing opportunities for start-ups and technical spin-offs.

As currently envisioned, the proposed open campus will be anchored by two facilities, an LLNL-led International Center for High Energy Density Science and the Sandia-led HITEC. In a separate venture that could create additional synergies, the city of Livermore is also considering the creation of a technology park in an area near the campus.

Though he's optimistic about the energy and enthusiasm surrounding the HITEC launch, Bob says a number of issues still need to be resolved before it's a viable program.

"Through what channels can we most effectively articulate the benefits of HITEC to potential partners? What role will we define for academia? We believe we've got an excellent value proposition to offer, and we intend to enhance it as we continue to engage our partners," says Bob.

Bob believes the foundation for a successful HITEC venture is in place at Sandia.

"The timing couldn't be better," he says. "There's a clear need, a new secretary of energy, and a new administration that has stated a commitment to energy security and innovation in transportation energy. Sandia has a distinctive blend of capabilities that make us an ideal entity to lead this effort. I expect us to succeed."

Those interested in learning more about HITEC are invited to visit its website at: www.HITECtransportation.org.

Sandia CaliforniaNews

Sandia researcher Jackie Chen named Asian American Engineer of the Year

By Patti Koning

Congratulations are in order for Jackie Chen (8351), one of 15 recipients of the Asian American Engineer of the Year Award (AAEOY). Jackie was honored at the AAEOY Award Banquet Feb. 21 in San Jose, Calif.

"I'm very honored," she says. "I was delighted just to be nominated."

JACKIE CHEN

The AAEOY is the only program of its kind held in conjunction with National Engineers Week. Organizers say one of the primary goals of the award program is to recognize outstanding Asian American professionals in academia, public service, and corporate entities for their contributions to the nation and their communities.

"Jackie has demonstrated the scientific excellence and leadership that most scientists aspire to," says Wen Hsu (8128), manager of Remote Sensing and Energetic Materials. "She had the foresight to recognize many years ago that the capabilities of supercomputers will grow so rapidly that computationally intensive direct numerical simulations of complicated processes would soon become a viable approach to model combustion processes at realistic spatial and temporal scales. Her achievements have been recognized by many DOE Office of Science awards over the past several years."

Jackie has been with Sandia for more than 25 years, starting as a graduate student through the Master's Fellowship Program at University of California, Berkeley. After completing her MS in mechanical engineering at Berkeley, she worked on thermal analysis of the W-87.

She returned to graduate school, this time at Stanford through Sandia's doctoral fellowship program, and earned a PhD in mechanical engineering. Jackie then joined the Combustion Research Facility (CRF), which she describes as a good fit with her doctoral research on compressible turbulent flows.

Her current research focuses on understanding fundamental turbulence-chemistry interactions in combustion using direct numerical simulation (DNS). She's received DOE INCITE awards in 2005, 2007, 2008, and 2009. The awards provide allocations on several of the nation's most powerful supercomputers to enable world-class research into high-impact advances in science; since 2004, Jackie has been awarded nearly 60 million hours of supercomputer time.

"These awards enabled us to move DNS into the petascale simulation scale, thereby providing quantitative predictability, something that was not possible five years ago," says Jackie.

Her current project, "High-Fidelity Simulations for Clean and Efficient Combustion of Alternative Fuels," is a partnership with Joe Oefelein (8351) and Oak Ridge National Laboratory. The project seeks to perform high-fidelity simulations of the complex aero-thermo-chemical interactions typically encountered in internal combustion engines, with an emphasis on fuel variability. Jackie is using DNS to understand the mechanism behind how a lifted autoignitive turbulent jet flame at high pressure is stabilized and how thermal and composition stratification effects in kinetically controlled compression ignition combustion can be used to control the rate of combustion.

Jackie explains that the goal of the underlying science is to enable the practical application of matching diverse fuel streams — biofuels, ethanol, and dimethyl ether — with novel engine designs. "The long-term goal is to use this research to optimize fuel efficiency and reduce emissions," she says.

She says she is extremely excited about where this research might go and that she gets to work in an area she loves. "I was intrigued with turbulent flows after participating in a wind tunnel experiment as an undergraduate at Ohio State," says Jackie. "At that point, I was hooked."

Computer audits still finding some misuse of web

Sandia monitors computer use throughout the Labs 24/7

By Kathy Congable (12420)

Andy Warhol's quip about 15 minutes of fame might well be expressed as 15 minutes of shame for Sandians caught viewing sexually explicit material on Sandia computers, Blackberry devices, and PDAs. In fact, the use of government-owned computers and other electronic devices to view such material can and has led to disciplinary action up to and including termination.

"Sandia continues to monitor computer use throughout the Labs 24/7 and any inappropriate use of the web or email, particularly those that contain pornography, are immediately flagged and investigated," says Chris Padilla, manager of Corporate Investigations (12420).

Although misuse of the web over the past year has not reached near the levels of the mid-1990s when more than 100 Sandians and on-site contractors were found to be using Sandia computers to view sexually explicit material on the Web, any misuse of government property is of concern and will not be tolerated, Chris says.

Using Sandia property to view inappropriate websites, as well as nonwork-related web activities such as web surfing, downloading music, and watching videos at work is unacceptable for several reasons. It is considered to be waste, fraud, and abuse since it causes lost work time and creates a hostile work environment. Sandia policy is very explicit about forbidding any websites or email that is disruptive, abusive, obscene, or degrading or offensive to others. This includes viewing and transmitting sexually explicit messages, images or cartoons, ethnic slurs, offensive racial comments, or anything that could be construed as harassment or showing disrespect for others, defaming or slandering others, or otherwise harming another person or business.

The government holds Sandia responsible for enforcing prohibitions against waste, fraud, and abuse of government property. Not only is there a financial loss to Sandia, but a potential loss of employment for individuals. Depending on the extent of the violation, the Sandia employee may receive discipline up to and including termination in accordance with CPR 300.4.3 "Employee Conduct and Corrective Discipline." A contractor can be removed from the contract, or the contract can be cancelled. Subsequently, the matter can be turned over to the DOE Inspector General and, in some cases, to the FBI for possible criminal prosecution.

There is no progressive ladder of discipline for viewing sexually explicit material — no "three strikes and you're out" rule, Chris says. A first-time offense, especially if it involves child pornography, will typically result in immediate termination.

"Computer audits over the past two years show that some members of Sandia's workforce are still not getting the message," says Chris. "Sandia keeps records of where individuals have been on the Web, so they cannot visit any website without leaving a trail of their visits on Sandia's servers and the amount of time they are spending at each site. This information is compiled and reported to Corporate Investigations for follow-up with the individual's management."

Chameleon

(Continued from page 1)

To switch motor proteins on and off, nature uses complex signaling networks. The Bachand group's switch is simpler. It involves the genetic insertion of a new binding pocket — a kind of docking port — in the motor protein's structure. What's bound and released are zinc ions. Bound zinc ions turn the protein's action to "off." Stripping zinc ions out with chemical agents allows the motor protein to work again. The effect is controllable, and even reversible.

Introducing an on/off switch

"We essentially reengineered the protein structure to introduce an on/off switch into the motor," says George. "So we can now turn our nanofluidic devices on and off."

Previous efforts at regulating motor activity have used fuel intake as a control mechanism: the less the fuel, the slower the process. The Bachand group's switch operates independently of fuel by reversibly "freezing" the motor. The advance resembles the improvement in early automobile technologies when a simple ignition switch took over for more complicated rheostats. The paper describing this work was a spotlighted article in the journal *Biotechnology and Bioengineering* (vol. 100, p. 478).

But what is it that the switch operates?

In a cover article in the high-profile journal *Advanced Materials* (Dec. 2, 2008), the Sandia team describes a kind of inverted cellular world where motor proteins do not run about but instead are upended so that their tails are embedded in a protein-modified layer on a glass slide. Microtubules — cylindrical protein filaments — instead of forming the stationary cellular skeleton of cells, are passed along by the waving feet of the motor proteins like crowd surfers at a rock concert, or like buckets passed hand-to-hand along a line of firefighters.

Protein-coated quantum dots

Coating the biotin (vitamin H)-modified microtubules are protein (streptavidin)-coated quantum dots — nanoscopic groups of atoms that emit light, their frequency dependent on dot size.

Though the dots operate differently from pigment crystals — the dots do not emit the same frequency of light that they adsorb, while the biological system merely reflects incoming wavelengths — they can perform a similar coloring function.

When the motors transport the microtubules and collisions occur, the microtubules tend to stick together and twist until they resemble the cord of a desk phone. The twisting process ultimately forces the formation of stable rings of approximately five micrometers diameter. Their docked quantum dots of cadmium selenide produce a particular range of light frequencies. When mechanical strain in the rings causes them to rupture, the cracked segments are tugged out by the nearby motors until the ring is completely disassembled. The formation and destruction of the two states — free microtubules and rings — can also be reversibly controlled.

A tug-of-war between motor groups

The process resembles the action of fish color changes, which require one group of motor proteins carrying pigments to be "on" all the time while a second group of motor proteins is turned on by complex biological processes at the right time. This produces a tug-of-war between motor groups that results in pigment dispersion and ultimately a color change. When the second motor is switched off, the color returns to the ground aggregate state.

"Our overall process mimics the fish," says George. "We essentially go from a dispersed particle state to a concentrated one and then back again to dispersed, similar to the fish. Thus, in principle, the mechanism could produce a color change. The underlying science provides a new basis for materials scientists to begin working toward real-world applications."

The work was supported by DOE Basic Energy Sciences and Sandia's LDRD office.

Key contributors to the Biotechnology & Bioengineering paper were Adrienne Greene (1132) and Amanda Trent (now a graduate student at University of California, Santa Barbara). *Advanced Materials* paper contributors were Haiqing Liu (now at Los Alamos National Laboratory), Erik Spoerke (1816), Marlene Bachand (1132), Steve Koch (former Sandia, now an assistant professor at the University of New Mexico), and Bruce Bunker (1816).

UT delegation visits Labs

(Photo by Randy Montoya)

A DELEGATION of senior officials from the University of Texas System visited Sandia March 4 to participate in discussions and presentations regarding projects involving both Sandia and UT researchers. Topics presented included biodefense, synthetic aperture radar, high energy density science, health care, the National Initiative of Modeling and Simulation, and the National Institute for Nano-Engineering. The delegation is seen here with Sandia officials including Labs Director Tom Hunter, center left, and Div. 1000 VP Rick Stulen, center, who hosted the visit.

Volunteers needed, healthy turnout expected

Things shaping up for Family Day 2009

Recently conducted research — a *Lab News Interactive* employee survey, to be precise — suggests that Family Day 2009, set for Albuquerque Saturday, May 16, will likely be a gathering of some 12,000-16,000 folks.

With an anticipated crowd of that size, the need for volunteers to work in capacities such as checking in guests or responding to myriad unexpected needs throughout the day is paramount.

"I'm sure none of us would want long lines at the various stations around the facility where hosts will be checking in their eager guests," says Rod Geer (3651), Family Day 2009 coordinator. "The best way to ensure that won't occur is to have ample volunteers on the scene that day — probably in the range of 100 to 200, in fact."

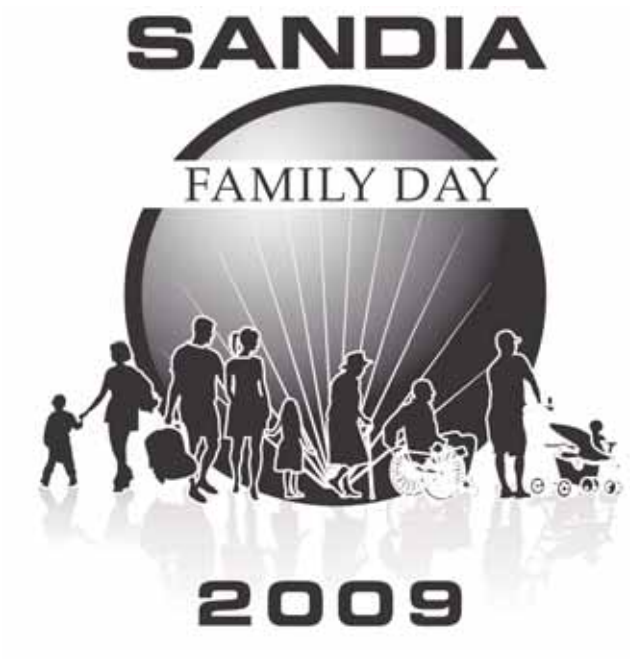
The Sandia Serves volunteer program, managed by Community Involvement Dept. 3652, will soon have a website that will provide an easy sign-up mechanism for people wanting to be volunteers. Remember, volunteers in these service areas for Family Day 2009 are just that. They are volunteering their time.

"If you already know you want to volunteer for all or part of the day, go ahead and contact the Sandia Serves volunteer program coordinator, Patty Zamora (844-2146, pgzamor@sandia.gov)," Rod says.

Not many specifics yet exist about exhibits, displays, or demos the Labs' various divisions plan to host; however, no matter what takes place it will be new for a lot of the Labs' population. Since the most recent Family Day in 1999, about 3,700 people have joined the Labs' workforce.

Some of the known things to do during the day will be a variety of family- and math/science-oriented activities located on Hardin Field, which also will be the site for an exhibit by the National Atomic Museum, due to open in its new location just south of Eubank and Central in April and rechristened as the National Museum of Nuclear Science & History. The medical organization and the Labs' Pro Force also will have some attractions on Hardin Field, and possibly other locations. A popular event that occurred concurrently with the 1999 Family Day — a classic car show (see sign-up form on page 16) — will make a return engagement. It will be near Hardin Field and during the same hours as Family Day 2009.

The Explora Science Center and Children's Museum of Albuquerque plans a presence on Hardin Field and discussions about participating are underway with other local science-centered attractions.



> *"I'm sure none of us would want long lines at the various stations around the facility where hosts will be checking in their eager guests. The best way to ensure that won't occur is to have ample volunteers on the scene that day — probably in the range of 100 to 200, in fact."*
>
> **Rod Geer, Family Day 2009 coordinator**

Food and drinks will be for sale at various locations as well.

A Family Day 2009 website will be launched soon. A visit there will provide a link to an all-important Family Day registration form along with information about exhibits, displays, and other details as they become available. The site also will have additional need-to-know items, particularly about safety and security as they pertain to getting ready for Family Day 2009 and during the actual event.

Although the website isn't quite yet ready, a number of important frequently asked questions follow (answers with additional details may be posted on the Family Day 2009 website when it goes live):

Q: *What are the hours for Family Day 2009?*

A: 9 a.m. to 3 p.m., Saturday, May 16. This means properly credentialed hosts and their guests will be able to begin entering Labs' facilities at 9 a.m. It means all hosts and their guests must promptly exit Sandia facilities and grounds at 3 p.m.

Q: *Who can attend Family Day 2009 as guests?*

A: Up to eight family members or close friends. All must be US citizens.

Q: *Can a non-US citizen family member or close friend attend?*

A: No. All such guests must be US citizens.

Q: *Can a non-US citizen member of the workforce (MOW) attend Family Day 2009?*

A: Yes, but all non-US citizen employees and contractors, both of whom are members of the workforce, must be escorted at all times by a US citizen MOW identified in an approved Foreign National Request Security Plan (FNR SP). All buildings/rooms that the non-US citizen MOW wishes to access on Family Day 2009 must be listed and approved on their FNR SP prior to accessing them.

Q: *Can a Sandia retiree attend Family Day 2009?*

A: Yes; however, Sandia retirees who do not have a current DOE-issued badge must be a guest of a badged individual in order to attend Family Day 2009.

Q: *Are there any age restrictions for guests?*

A: No, and this differentiates Family Day 2009 from an event like Take Our Daughters and Sons to Work Day, which actually is being incorporated into Family Day for this year only. Because the age range of guests will be significant, employees who currently have access to a bypass gate can bring strollers or wheelchairs through that gate. A guard will be posted at the Tech Area 1 Gate 10 bypass gate to check IDs and open the gate for guests of hosts who do not have access to a bypass gate.

Q: *Can a personally operated vehicle (POV) be driven into the limited areas?*

A: Only if you have a current, approved pass to drive into limited areas. Use Gate 10 for entering and leaving Tech Area 1. This pass cannot be loaned to any other individual.

Q: *Can government vehicles, GEMs, and EZ-GO carts be used on Family Day?*

A: No. Vehicle traffic will be limited to approved POVs, security, and emergency vehicles. Bicycles, skateboards, roller blades, roller skates, and scooters are also prohibited.

Q: *Is there a chance that Family Day will be canceled?*

A: Family Day planners are taking every step and precaution to ensure that a cancellation does not occur. However, should the need arise to bring Kirtland Air Force Base to a heightened state of security, it is possible non-government identification cardholders could be denied access during that condition, in effect, canceling the event. Base officials report they will do all they can to avoid such an unplanned inconvenience.

60th anniversary

(Continued from page 1)

• Sandia President and Labs Director Tom Hunter will address the Greater Albuquerque Chamber of Commerce at a luncheon scheduled May 14. Tom will talk about Sandia's evolving mission and contributions to national security as well as the Labs' significant economic impact and community support in the Albuquerque area.

• Family Day New Mexico, scheduled for May 16, will be Sandia/New Mexico's first Family Day since one held a decade ago for Sandia's 50th anniversary (see story above).

• Appearing a few days before Family Day will be a special tabloid insert in the *Albuquerque Journal*, highlighting Sandia's history and many contributions to national security.

• A colloquium is being planned for Sept. 16 in Washington, D.C., at the US Capitol Visitor Center. The colloquium theme is "All Things Nuclear" and will focus on the role the nuclear weapons laboratories have played in world history over the past 60 years, including their future roles in national security, nuclear stockpile stewardship, nonproliferation, treaty verification, the control of nuclear materials, and technology transfer. Invited guests will include members of Congress and their staffs, and representatives of various federal government agencies, including the departments of State, Defense, and Energy.

In California, Ron Stoltz (8302) has taken the lead for Div. 8000's 60th anniversary celebration activities. Ron led the California site's 50th anniversary celebration in 2006 and has been at Sandia for 30 years.

"This celebration allows us to highlight the broad national reach of our activities as well as the international impact we have had in a variety of programs, including energy security, nonproliferation, cooperative monitoring, and international science collaborations" Ron says.

The California site's approach to the celebration centers on two outreach events. The first, Ron says, is to take place this summer and would be a "welcoming week" focused on introducing the yet-to-be-announced new Div. 8000 vice president to the Livermore area congressional delegation and to Div. 8000 programs. The activities will include internal seminars and displays featuring both past accomplishments and new directions in key program areas.

In October, celebration invitations will be extended to local VIPs and major Lab supporters and partners. The event may help launch the proposed Livermore Valley Open Campus, a joint facility of Sandia and Lawrence Livermore National Laboratory to enable closer interaction with industry and academia and to promote local economic development.

Ron says that Div. 8000's 60th anniversary plans are still in the conceptual stage and their timing and scope may change to accommodate Laboratory needs and visitors' schedules.

SUSAN ALTMAN (6316) conducts research in her laboratory in Bldg. 823 on minimizing biofouling on reverse osmosis membranes used for desalination. (Photo by Randy Montoya)

Desalination of saline and brackish water becoming more affordable, Sandia researcher finds

Sandia water researcher Mike Hightower discusses intersection of fresh water and water treatment costs

By Chris Burroughs

Treating brackish water for human consumption "can be done and be done affordably" here in New Mexico and other parts of the country, says Mike Hightower (6332), Sandia water researcher.

Mike was among several presenters who recently talked at a public forum in Albuquerque about the promises and perils of desalination of saline or brackish waters. The event was sponsored by the Middle Rio Grande Water Assembly, a nonprofit group that focuses on water issues, and the University of New Mexico's Water Resources Program.

Competitive costs

"The cost of treating ocean and brackish water has fallen enough that it can be comparable to the expenses associated with developing new freshwater supplies," Mike says. "It used to cost 50 cents per thousand gallons of water to supply freshwater. That is now up to $3 to $4 per thousand of gallons of water — due largely to the fact that freshwater near cities is generally already being used and utilities frequently have to pump water long distances, often as far as 100 miles, to get new freshwater supplies. This raises the cost of new water supplies and the associated price of water."

At the same time, the cost of treating saline and brackish water has come down — to $2 to $3 per thousand gallons for water being treated at the ocean and $4 to $6 per thousand gallons for inland treatment.

"By the mid '90s you started to see the increasing costs of freshwater intersecting with the reduced costs of treating saline and brackish water," Mike says.

It's unlikely, however, that future water bills will be tripling or quadrupling because water that has been desalinized through processes such as reverse osmosis will often be only used to supplement current freshwater resources, not as the sole drinking water source for communities. It will become one of many tools in the toolbox, such as efficiency improvements and wastewater reuse, to meet future water supply demands.

30 million gallons of water a day

The use of desalinized water is growing more popular in places like Alamogordo, N.M., and El Paso, Texas, two communities that sit in the Tularosa Basin, which contains an essentially underground lake with brackish water that is 2,000 to 4,000 parts per million (ppm) total dissolved solids (TDS), better known as salt. The most easily treatable form of brackish groundwater has from 2,000 to 5,000 ppm TDS, so the groundwater in the Tularosa Basin falls well within the limits.

El Paso recently constructed the world's largest inland desalination plant to produce 25 percent of the city's water, or about 30 million gallons of water a day. Other communities in the Tularosa Basin that could use this brackish groundwater include White Sands Missile Range, Carrizozo, Corona, Chaparral, and Horizon City. Horizon City already has a working plant, and Alamogordo has obtained water rights to start a desalination plant there. Alamogordo is also the location of the Brackish Groundwater National Desalination Research Facility that was opened last year to support research and development of new desalination and concentrate management approaches for brackish groundwater.

> *"It's not a silver bullet and definitely not a pipe dream either. It is a reality. In the US, desalination treatment has increased by a factor of four over the past 15 years."*
>
> **— Sandia researcher Mike Hightower**

West Mesa potential

Recently, brackish groundwater identified under Albuquerque's West Mesa has received a lot of attention and studies and testing are currently underway to assess the costs and sustainability of this potential new water supply. However the water is more than 10,000 ppm TDS, much higher than normally considered for cost-effective treatment, and its potential is being assessed carefully.

Mike says a 1974 report, "New Mexico Water Resources Assessment for Planning Purposes," estimated there are 15 billion acre-feet of groundwater in New Mexico. Seventy-five percent of that is brackish.

"The problem with that estimate is that the brackish water estimates include water down to 4,000 to 5,000 feet below the surface," he says. "Freshwater is generally less than 500 feet below the surface."

It is easier to get the freshwater, and no one has ever really done much pumping of the brackish waters 4,000 to 5,000 feet deep.

"We may be significantly overestimating the amount of recoverable brackish water — water that is easy to get to and use," Mike says. "Some analyses suggest that the amount we can recover is only a fraction of the initial estimate. We won't know until more testing is done. If it's not economically recoverable, the water will not help us much and should not be counted on."

The question asked at the public forum where Mike made his presentation was "Is desalination a silver bullet or pipe dream?"

"It's not a silver bullet and definitely not a pipe dream either," Mike says. "It is a reality. In the US, desalination treatment has increased by a factor of four over the past 15 years. Desalination is used in most all 50 states and in many countries all over the world. It is accepted and can be a cost-effective approach to supplement current freshwater resources and meet our future water supply needs."

Sandia researchers construct silicon qubit nanodevices — on path toward first silicon qubit

By Nigel Hey

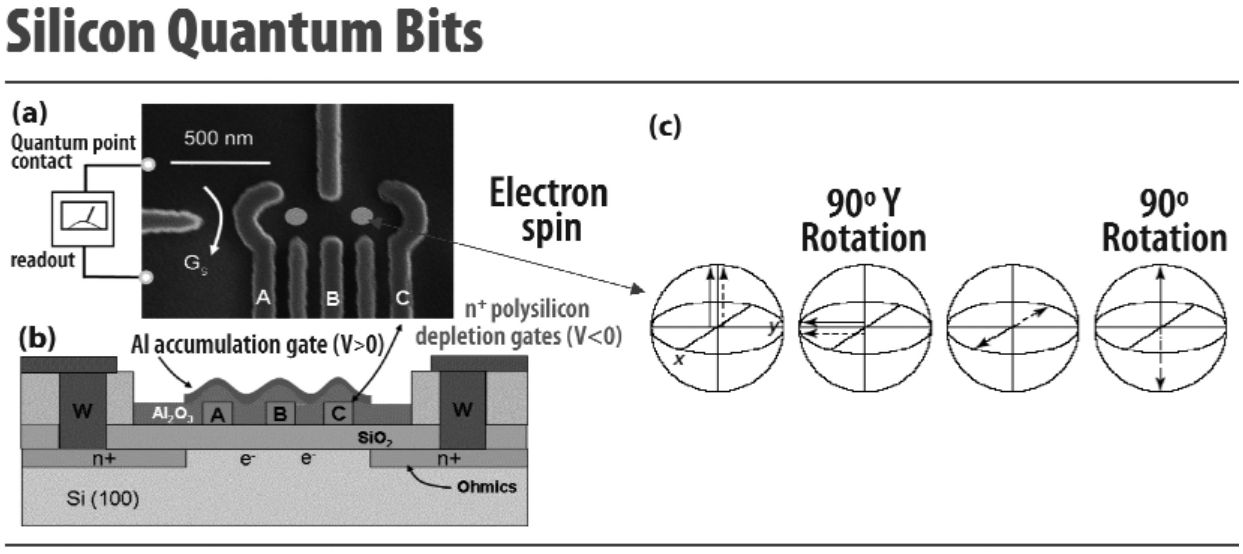


Figure 1: (a) scanning electron microscope image of Sandia's dual quantum dot structure fabricated in silicon (the dots suggest the approximate location of the electron position); (b) schematic cross section of the quantum dot structure showing the position of the single electron locations; and (c) schematic representation of spin manipulation using rotation and precession of two different spins.

Sandia scientists are engaged in a three-year research effort to produce the world's first silicon spin-based quantum bit (qubit), the basic information storage element in quantum computers. The Sandia team began to fabricate silicon nanoelectronic devices in June 2008, with the eventual goal of isolating, measuring, and manipulating single electrons — functions central to qubit operation.

Interest in developing quantum information processing has blossomed because of the promise that quantum algorithms can efficiently solve some problems that are challenging for conventional computer systems. Sandia's interest in quantum information processing is motivated by its interest in advanced computing architectures and the fact that future engineered systems will require increased understanding of quantum effects. Quantum computing may also provide new means of simulating very complex physical systems, enhancing the search for new chemical compounds, including pharmaceuticals.

Answering the Grand Challenge

Research is progressing through the Quantum Information Science and Technology (QIST) Grand Challenge LDRD (Laboratory Directed Research and Development), which is funded through 2010. Researchers have already demonstrated a quantum dot single-electron transistor using processes compatible with Sandia's 0.35 micrometer CMOS (complementary metal oxide semiconductor) fabrication line. "This represents a significant step toward developing quantum dot systems for qubits with control and read-out done on-chip," says project manager Rebecca Horton, Information Operations Program 5640.

Quantum computers may someday complement conventional "classical" computers by using some of the unusual properties found in quantum systems to speed up computation times. Their internal qubits will trap an electron within a tiny region known as a quantum dot and use its built-in property of spin (angular momentum) to record information.

"Certain problems that are intractable for conventional computers could be solved exponentially faster by a quantum computer," says principal investigator Malcolm Carroll of Photonic Microsystems Technology Dept. 1725. "Quantum information science and technology are considered important to secure communications, develop novel sensing concepts, and augment classical information processing. A quantum computer would offer dramatic speed-up in certain problems such as number factoring and data set search algorithms, which would have significant impact on data analysis. It's also been suggested that a quantum computer could improve simulation of complex physical systems that perhaps would impact drug discovery and development of new compounds."

Integrating with CMOS circuits

The group's current work in making silicon nanoelectronic devices is aimed at producing similar structures that can be integrated with classical CMOS microelectronic circuits. Nanopatterned gate features as small as 50 nanometers are used to cause individual electrons to be moved and trapped in response to the application of external electrical signals. Early measurements have shown dramatic changes in electrical properties (resonances due to single-electron transistor action) that arise from the addition of or removal of a single electron from a quantum dot measuring less than 100 nanometers.

"We propose to fabricate silicon-based quantum dots and extremely sensitive charge electrometers that are coupled to one another," says Malcolm. "Electrostatic gating of these quantum dots will be used to control the electron spin and coupling between spins to demonstrate necessary operations for quantum computing, like state preparation and coherent manipulation [e.g., spin swap]."

An important challenge is to engineer the CMOS for best possible operation at ultra-cold temperatures, because even simple quantum circuits made from silicon qubits will require that the system run at cryogenic temperatures (e.g., 0.1 degree above absolute zero, 0.1 kelvin). For this reason the quantum computer's expected future role is as a relatively expensive but extremely capable partner, rather than a successor, to the classical computer.

Classical computer technology records information by placing a bit in one of two distinct states, zero and one. Using a quantum particle to record the states, on the other hand, involves the use of properties not available in the classical world — quantum superposition and entanglement. Superposition provides an indeterminacy, or uncertainty, about which state the qubit is in, and entanglement allows qubits to affect each others' states. Special programs can be written to take advantage of these properties and speed up computation.

Recently it was shown elsewhere that quantum dots can be formed from gallium arsenide. However, quantum dots made from silicon are expected to be more reliable over longer computation times, and easier to integrate with classical silicon circuitry.

Subtasks within the QIST Grand Challenge are led by Michael Lilly of CINT Science Dept. 1132 (quantum dot qubit design, fabrication, and characterization); Ed Bielejec of Radiation Solid Interactions Dept. 1111 (second-generation qubit design, fabrication, and characterization); James Levy of Mixed Signals ASIC/SoC Products Dept. 1735 (CMOS architecture); Tom Gurrieri (also 1735) (circuit design); Richard Muller of Multiscale Dynamic Material Modeling Dept. 1435 (materials modeling and simulation), Anand Ganti of Advanced Networking Integration Dept. 9336 (logical qubit error correction); and Tom Tarman of Embedded Systems Engineering Dept. 5632 (logical qubit architecture). Tom is also QIST's deputy project manager.

Winning their spurs

Sandians earn thanks — and spurs— from Forest Service for help with wild horse census

SPURRING THEM ON — Anthony Madrid (middle), wild horse and burro coordinator and ranger for Carson National Forest, said thank you in a special way last week to Isaac Toledo (5432), left, and Casey Giron (5433) for helping National Forest Service rangers in the Jicarilla Wild Horse Territory. The Sandians investigated the possibility of using Sandia-developed sensors to detect the location of wild horses to trap and relocate them. Madrid presented Isaac and Casey with plaques and spurs that carried Carson National Forest medallions. Also receiving a plaque and spurs was Josh Jacob (2623), who was unable to attend the thank-you ceremony. In the picture below, Casey and Isaac show off their new spurs.

(Photos by Randy Montoya)

Group long-term care insurance plan now available

Note: The following information is provided by Sandia's Benefits organization.

Sandia is pleased to offer a valuable, voluntary, participant-paid benefit program:

Group Long-Term Care Insurance, underwritten by John Hancock Life Insurance Company.

What is long-term care insurance?

Long-term care insurance provides coverage for extended care that may be needed for a long-term physical illness or injury, a disability, or a cognitive impairment (such as Alzheimer's disease) that Medicare and health plans typically do not cover. This insurance helps you protect your financial resources by providing coverage for your personal care if you become unable to perform everyday tasks such as eating, dressing yourself, or bathing; it does not generally include care needed to improve or correct medical problems. This insurance could be used to pay for a nursing home, an adult day care center, an alternate care facility, respite care, and/or home health care.

Why did Sandia select John Hancock Life Insurance Company?

Since employees will be paying the entire cost of this insurance and may not be using the benefit for a number of years, Sandia wanted to be sure the company chosen is able to deliver on the coverage and service it promises. We selected John Hancock to be the plan's insurer for its financial stability, leadership in the field of long-term care insurance, and ability to provide meaningful benefits and superior customer service to Sandia employees.

Who is eligible?

Eligible participants include employees who are actively at work and regularly scheduled to work at least 24 hours per week, spouses or qualified domestic partners, parents and parents-in-law, siblings and their spouses, adult children and their spouses, and grandparents and grandparents-in-law of eligible employees. Retirees and spouses of retirees are also eligible to apply. All applicants must reside in the US (50 states or D.C.) on their effective date of coverage. This requirement does not apply to eligible active employees and their spouses/qualified domestic partners temporarily residing outside the US applying with their US residence address. All certificates will be mailed to the US residence address. Employees who are on a leave of absence or disability are not eligible to enroll until they return to work on a regular basis.

When can I enroll?

The enrollment period runs from March 9-April 10. Eligible, actively-at-work employees enrolling by April 10 will receive guaranteed acceptance into the plan. Guaranteed acceptance means that you will not have to provide proof of good health in order to enroll.

After April 10 you may still apply for coverage, if eligible, but will need to provide proof of good health before being accepted into the plan. Your eligible family members (as described above) will need to provide proof of good health when applying at any time.

More details coming soon

You will receive more information on the Sandia Group Long-Term Care Insurance Plan in the coming weeks. We encourage you to read the materials and think about whether this insurance might help meet your long-range financial needs and goals.

In addition to the informational home mailings, John Hancock has established a dedicated website at http://sandia.jhancock.com (username: sandia; password: mybenefit), toll-free telephone number, and customer service team for the Sandia Group Long-Term Care Insurance Plan.

Group Long-Term Care Insurance is underwritten by John Hancock Life Insurance Company, Boston, Mass. 02117.

New Mexico employee presentations

March 16, Steve Schiff Auditorium, Bldg. 825
8-9 a.m.
9:30-10:30 a.m.
2-3 p.m.
3:30-4:30 p.m.
March 17, Steve Schiff Auditorium, Bldg. 825
7-8 a.m.
8:30-9:30 a.m.
10-11 a.m.
2-3 p.m.
3:30-4:30 p.m.

California employee presentations

March 19, 904 Auditorium
10-11 a.m.
11:30 a.m.-12:30 p.m.
1- 2 p.m.

Webinar presentations for all employees

March 24, 11 a.m. MDT
April 1, 1 p.m. MDT

Shortly before the appointed time, please dial 1-866-814-1915 to be connected into the session. You may follow the presentation in real time via Sandia Group Long-Term Care website at http://sandia.jhancock.com (username: sandia; password: mybenefit). You can also download a copy of the materials that will be used for these presentations at the same website. From the homepage, click on "Meeting Information."

'Luckily, they always found a place for me'

Gus Simmons wins UNM Alumni Association's Zimmerman Award

As the latest recipient of the University of New Mexico Alumni Association's James F. Zimmerman Award, Sandia retiree Gus Simmons joins a distinguished list of past recipients including Lt. Gov. Diane Denish, former US Sen. Pete Domenici, artist Betty Sabo, writer Tony Hillerman, and others.

Gus, a cryptographer and former manager of the Applied Mathematics Department and Senior Fellow at Sandia, worked primarily with authentication theory. He began his post-secondary education at Deep Springs College and he received his PhD in mathematics from UNM.

GUS SIMMONS at the time of his retirement from Sandia. (Photo by Randy Montoya)

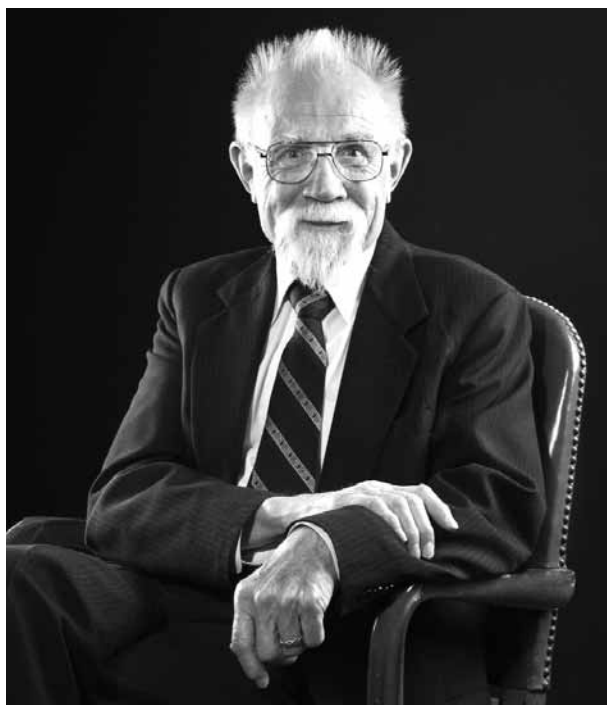
Gus has published more than 170 papers, many of which are devoted to asymmetric encryption techniques. His technical contributions include the development of subliminal channels for use in digital signatures. He is also the creator of the Ramsey/graph theory-based mathematical game Sim.

The James F. Zimmerman Award is given to an alum of the University of New Mexico who has made a significant contribution that has brought fame and honor to the University of New Mexico or to the State of New Mexico. The award was presented this year in a ceremony at Hotel Albuquerque.

A new hire four times

In accepting the award, Gus recounted, "Fifty-five years ago I began an association with two institutions which have had a profound effect on both my life and on my career. That year I enrolled as an undergraduate at UNM and hired in as an electronics technician at the Sandia National Laboratory. Neither association would follow a smooth path to the expected endpoint.

"It would be 15 years, and only after receiving degrees in mathematics and physics from other institutions, before I received a PhD from UNM and 38 before I retired from Sandia — only 32 of which were spent at the Labs. In that time I set a record for the number of times any Sandia employee has been hired in as a new hire: four times in all. On the third time I returned to Sandia, Jim Scott, a supervisor for whom I worked on a couple of occasions and a close friend of Bill Myre who is here as my guest tonight said, 'Simmons; this is just where you come between jobs.' Luckily, they always found a place for me. Even so, I wasn't willing to try for five. . . ."



GUSTAVUS SIMMONS, recipient of the 2009 James F. Zimmerman Award from the University of New Mexico Alumni Association. (Photo by Randy Montoya)

"Several years ago one of my colleagues left Sandia to go to work for Hughes Aircraft in Los Angeles. A year or so later I ran into him at a professional meeting and asked the natural question: 'How's the new job, Virge?' 'Gus,' he said, 'Let me tell you. I am doing just what I would do if I were rich and could do what I wanted to do.'

"Virge's words are a perfect description of my career. For most of it I did just what I would have done if I had been rich and able to do anything I wanted to do. That was possible only because teachers prepared me and managers allowed me to do that. So this award is as much a tribute to what all of those persons did as it is to anything I did."

The man who — almost — wasn't there

In introductory remarks, Karen Abraham, executive director of the UNM Alumni Association, shared a number of interesting and sometimes amusing anecdotes that have punctuated Gus's life and career.

For example, Abraham recounted a story told by one of Gus's former managers.

"A Sandia Labs colleague and one-time supervisor, Bill Myre, calls Gus 'the smartest of the smart' whom he almost never met. Here's Bill's account: 'I met Gus in 1953 when we both worked in the field test organization. A friend in the data playback station told me the smartest guy in the building worked there. I'd visited the playback station often but had never seen Gus.

'Gus was a new technician assigned to a pompous PhD who had decided to invent his own computer. Gus was assigned to build it. Full of vacuum tubes, it never worked for very long. But they got it to working and the PhD went to get his boss to see his wonderful invention.

'When the boss arrived the computer broke and the boss laughed and went back to his office. The PhD was furious at being embarrassed and told Gus he was fired, to go over to personnel and turn in his badge.

'Gus did, but the personnel rep told Gus he could still report to the playback station, but he must never let the PhD find out he was there. Gus installed a bell that rang when anyone entered the station so he could run and hide behind the racks of electronic equipment.' That was why Bill [Myre] had never seen him."

A UNM colleague, Abraham said, calls Gus a "personable genius."

Gus holds an honorary doctorate from the University of Lund, in Sweden, was Rothschild Professor of Mathematics at Cambridge University, and received the highest honor the US government bestows upon scientists, the E.O. Lawrence Award, often called the American Nobel prize.

Said Abraham: "We are thrilled to add our Zimmerman Award to Gus' accolades. Gus, we want to thank you not just for your brain but for how you've used it, for your contributions to research and national and Internet security, and for your outlook on life. Your association with UNM gives our alma mater special distinction."

Process for promoting nonexempt to exempt staff changes

By Julie Hall

A four-year-old process enabling the promotion of nonexempt staff to exempt positions has changed in response to customer feedback and a recent review to ensure the process was efficient and continuing to meet the needs of the Labs.

The changes become effective March 15.

The new process, called Promotion to Staff, is designed to be simpler and easier to understand and implement, and includes a number of checks and balances designed to promote equitable treatment of candidates and ensure that successful bidders are able to compete with their peers at the exempt level. The new process replaces the old Promotion to Exempt Staff (PES) process.

"Since the PES process was established four years ago, Human Resources has received a lot of feedback and suggestions from the line, executive management, and PES candidates themselves," says Compensation Manager Melissa Creange (3002). "These changes are designed to address a variety of concerns and to simplify the process as well."

New promotion to staff actions may be processed under the new policy effective March 15 and are not subject to a hiring hold put in place in October or a hiring hold exception process established in December. Actions initiated under the old PES process and not yet complete due to the hiring hold may be processed with the approval of the division VP and Human Resources and Communications VP.

Changes affect interview process, approvals

All exempt positions at Sandia are filled through the post-and-bid process. Once a hiring manager determines that a nonexempt bidder is the best candidate for an exempt position, the Promotion to Staff process begins. Candidates who are promoted from within the Labs must meet the same standards of knowledge, skills, and abilities as those hired from outside Sandia. Candidates are also evaluated as to their ability to compete with their peers at the exempt staff level.

"The intent of this process, both under the old requirements and the new, has always been to promote a high-quality workforce at Sandia and to adhere to the basic premise that Sandia hires people for a career, not just a job," says Melissa.

Changes to the process affect both the interview process and approvals needed for these promotions.

Under the new process, the job candidate will be required to undergo an interview with the hiring manager, the human resources business partner, and another manager outside the division. A Compensation Department representative will conduct a post-interview meeting of the three interviewers. The unanimous agreement of all three interviewers is required for the promotion to proceed to the appropriate VP(s) for final approval.

For a nonexempt candidate to be hired for an exempt position within his or her center, approval from both the line VP and the Div. 3000 VP would be required. If the nonexempt bidder is the successful candidate for an exempt position in another center, only line VP approval would be necessary.

Other changes to the PES process include:

• Nonexempt candidates selected for an exempt position may be promoted only to the first level of that exempt position. For example, a candidate cannot be promoted directly from nonexempt to the senior or "S" level or into management without Div. 3000 VP approval.

• Behavioral-based interview questions have been incorporated into the process.

The new process maintains line involvement while including HR participation earlier in the process. Also, it specifies who the interviewers will be and requires their unanimous agreement for a promotion to proceed, which is designed to address complaints about perceived gaming of the process, Melissa says.

Questions about the process should be directed to division human resource business partners or to Lori Messex in Compensation.

Sandia team to assess university programs

By Julie Hall

Sandia's university-based education programs are undergoing an in-depth evaluation designed to assess the programs' alignment with the Labs' strategic intent, identify constraints, and look for areas for potential improvement.

The programs being assessed are the Tuition Assistance Program and the suite of Special Degree Programs, which includes the Doctoral Studies Program, the Special Master's Program, the Master's Fellowship Program, and the University Part-time Program. As of the end of FY08, there were 523 Sandians participating in these programs.

Led by Information Systems & Services Center 9500 Director David Williams, the diverse, cross-functional team consists of eight Sandians at the manager and senior manager level. Corporate Learning & Professional Development (CL&PD), which oversees University Programs, is facilitating the effort and serves as subject-matter experts. The assessment is being conducted at the request of the Executive Office. Div. 5000 VP Jerry McDowell and Div. 3000 VP John Slipke are executive sponsors of the assessment.

The assessment began last month and is expected to be completed by early June. Any changes resulting from the assessment will apply only to new participants in Sandia's university-based education programs; current participants would continue under current policies and guidelines.

This assessment is part of a series of efforts by CL&PD and the Executive Office to respond to increased demand for educational programs to meet Sandia's mission needs.

Recently CL&PD made changes in its approach to educational assistance by aligning its university assistance programs with the corporate university partnerships strategy. This will promote the establishment of partnerships with a focused set of universities to nurture talent, collaborative research, and national advocacy. CL&PD also has been placing more emphasis on various accreditation programs for schools to help focus on university programs in key areas and target schools of importance to Sandia and its missions. The assessment of University Programs will support CL&PD efforts to collaborate with its customers and develop the workforce needed for Sandia's current and future success.

KNME honors Sandia for efforts to promote science learning

"I WANT TO BE A SCIENTIST" — KNME, the public television station affiliated with the University of New Mexico, recognized, from left, Clint Hobart (6472), Bernadette Hernandez-Sanchez (1815), Michael DeWitte (3650), Karen McDaniel (2991), and Justin Garretson (6472) for Sandia's involvement with KNME and the Science Central concept. The Sandians were interviewed about what made them decide to become scientists, what they do, and why they like it. They are featured on the KNME website, which aims to help students who are interested in science see what real people do on the job. The interviews are available on the KNME Science Central website (see below) at www.knme.org/sciencecentral.

TROOP SUPPORT

Volunteers pack more than 10,000 care packages for troops

It was a massive assembly line as more than 140 volunteers from Sandia and Kirtland Air Force Base last Saturday packed more than 10,000 care packages for troops serving in Iraq and Afghanistan.

The event was part of the United Service Organizations' Operation USO Care Package program, which since 2003 has provided more than 1.5 million care packages to troops. The USO sends approximately 25,000 packages a month to deployed service members.

Patty Zamora (3652), Sandia organizer of the event, says the USO Care Package Program director said Saturday's group was the fastest and most organized group he had ever worked with.

"It was nice to hear how these packages help boost the morale and welfare of our troops," says Patty. "It lets them know they're appreciated and not forgotten."

The care packages include approximately $75 worth of items requested by service members, such as a prepaid international phone card, sunscreen, travel size toiletries including shampoo, body wash, toothpaste, lip balm, and hand sanitizer. The packages also include snacks and a personal message of support from donors.

Story and photos by Michael Padilla

STUFFING PARTY — In photos below, clockwise from left, Deputy Director for Integrated Technology Programs Joan Woodard, right, responds to questions from Paul Sigurdson, videographer from KOB-TV Channel 4. BJ Jones (3030) works the assembly line; some of the 140 volunteers packing items for troops in Iraq and Afghanistan. Joniva Mondragon (5415) prepares the final package.

About the USO

Until Every One Comes Home.®

Since before the US entered World War II, the USO (United Service Organizations) has been the bridge between the American public and the US military. In times of peace and war, the USO has consistently delivered its special brand of comfort, morale, and recreational services to the military. The USO, a congressionally chartered, private, nonprofit organization, relies on the generosity of individuals and corporations to support USO activities. Today, the USO delivers its programs and services at more than 130 locations around the world. In recent years, the USO opened centers in Kuwait, Qatar, and Afghanistan to support service members participating in Operations Enduring and Iraqi Freedom, as well as centers in Vicenza, Italy, and at the Dallas/Fort Worth, Raleigh/Durham, and Denver International airports. Military personnel and family members visited USO centers more than 5.3 million times last year. Services include free Internet and email access, libraries and reading rooms, housing assistance, family crisis counseling, support groups, game rooms, and nursery facilities.

The USO reaches out through:

- Airport centers, welcoming weary military travelers with a place to rest and the ability to familiarize themselves with their new surroundings
- Family and community centers, promoting intercultural understanding and orientation to unfamiliar locations
- Mobile USOs, reaching out to troops in remote and sometimes unstable locations

USO celebrity entertainment tours bring volunteer celebrities to entertain, lift morale, and express the gratitude and support of the American people. For 68 years, the USO"s mission has remained the same. The USO will support US troops and their families wherever they serve. Across the US and around the world, the American military knows that the USO is there for them. By supporting the USO, Americans show their appreciation and express their gratitude to the men and women who defend us. *—Information from USO website*

Employee death

Sir Paul Simon, we give you permission to go home

By Iris Aboytes

Paul Simon (5925) died unexpectedly on Feb. 19. He was 50 years old.

"Paul was responsible for leading projects focused on analysis of proliferation issues," says his manager, Rick Contreras. "Paul did everything in his power and creative skills to defend and protect the security of the United States."

Before Paul came to Sandia, he worked in South Korea building nuclear power plants. He worked as a Foreign Service officer in China and Korea and was fluent in Chinese Mandarin and Korean and could speak German, Spanish, and some Russian.

"I was privileged to travel to the Russian far east with Paul," says his former manager Roger Hartman (6416). "I was amazed at the reaction of both Koreans and Chinese to this American who spoke their languages fluently and effortlessly. Paul could put today's situation into historical context in a way that anyone could understand.

Over the last few years of his life, Paul decided to become proactive about his health. With characteristic focus and discipline, he shed some 165 pounds. Above and at left are before and after photos depicting the progress he made.

Called it like he saw it

"He was brilliant and extremely disciplined with a fantastic sense of humor and no use for political correctness. He called it like he saw it but always respected others' opinions and was infallibly a gentleman."

"On numerous occasions, Paul was able to impart his knowledge about Asian countries both formally and informally to our customers," says Rick. "His presentations had a flare for drama as he would wear the country's military uniform, headgear, belt, and binoculars, and then proceed to converse fluently in that country's native tongue. He did this while expounding on the country's virtuous society. He was convincing, colorful, and accurate."

"Paul was a treasure," says Jeffrey Martin (5923). "Of all the remarkable things about Paul, the aspect of his life that stands out most in my mind was his deep, consistent faith in Jesus Christ as his God and savior. He was knighted in an Orthodox service organization because of his charity work. I liked to call him 'Sir Paul.'" Adds Coleen Walton (5926) "his whole personality and character were based on his personal relationship with Christ. The humility and gentleness in which he lived were just reflections of the joy he felt in his faith."

A daring rescue

"His stories included the rescue of an American woman from North Korea by commandeering an SUV from South Korean hosts. He was able to bring her to freedom, but this act damaged his State Department career. Paul never regretted helping her" says Coleen.

"Around the suite, we had a name for Paul — it was either 'Mr. Google' or 'Mr. Encyclopedia'," says Pat Cleland (5925). "No matter what you asked Paul, he always had the answer. The last thing he would tell me every evening was, 'Pat, I give you permission to go home,' even though it was not time for me to leave."

"I still smile when I remember how Paul caught several of his colleagues off guard by proudly announcing that he and his wife Glenda were adopting a baby girl," says Alfred Romo (10248). "Imagine our surprise and delight when he sent us pictures of his new baby girl. The 'baby girl' was a Newfoundland puppy that he named Jett. Paul had plans for him and Jett.

"Jett aside, he was a tremendous inspiration to me as well as others at Sandia with his amazing physical transformation (he lost 165 pounds in recent years). The willpower to accomplish what he did was nothing short of astounding."

A lively curiosity

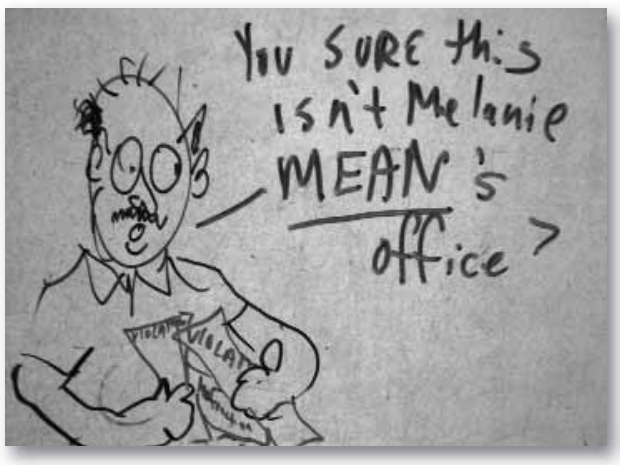
"I like to think that it was Paul's bachelor's degree in psychology that we all resonated with," says Irene Dubicka (5925). "He had a lively curiosity about the human side of events — some of the intense experiences and vivid, long-standing memories in our past that help make us the unique individuals we are.

"He and Glenda operated an on-line store they called Justinian's Jewels, where they bought and sold Byzantine art. They used to go to the annual rockhound and gem shows to pick up precious and semi-precious stones to make religious jewelry."

"He loved to tell me stories about Glenda and the beautiful jewelry she made," says Nancy Hayden (5925). "His primary focus was always to do the right job, and to get it done right. These two qualities don't often come together. He was truly a worker among workers."

"I moved into an office in the main hallway of Bldg. 810E with a whiteboard on the door," says Paul Justice (5923). "I got numerous comments on how fun it was. People would write numerous comments. One day it was blank when Paul was walking by. I told him people were sad it was blank. Paul immediately grabbed a marker and drew a cartoon of my face. It took about three minutes. One of the cartoons I remember is the one he drew for Thanksgiving. It portrayed an individual asking me if he needed to report contact with his turkey as a foreign contact and me thinking 'What a turkey.'"

"Paul had a very kind soul, always had a kind word to say," says Beverly Padilla (5925). "He was an inspiration to all on his dedication to lose weight and become healthier." Paul became famous around Sandia for losing those 165 pounds. "He became a dedicated bodybuilder and exerciser," add Jeffrey. "He worked out 90 minutes each morning, six days a week. He also loved to swim."



PAUL'S LAST DRAWING — Paul Simon had a habit of drawing cartoons on his office whiteboard. This was his last drawing, made shortly before his death. His irreverent drawings, usually poking fun of something around the office, kept everyone amused.

"Paul was brilliant, with a very sharp wit and insight," says Coleen. "He told me that he was always surprised and a bit alarmed that no one ever questioned his wife's passport since he was the issuing official. At the time they were married, he was assigned to a very remote office and was the only one there who could issue United States passports."

"It seemed that Paul's life had come full circle," says friend Rubel Martinez. "He had a great job and a rich home and spiritual life. He met his weight goals and finally had the dog he always loved. I don't believe there was anything he was wanting for. So I guess, like he said to Pat — We give you permission to go home, even though it was not time for you to leave."

News briefs

Atomic Museum black tie reception, Trinity Site tour

The new National Museum of Nuclear Science and History will host a grand opening black tie reception at its new Eubank and Southern Boulevard location Thursday, April 2, beginning at 6 p.m. Tickets for the evening, celebrating the new location and transition from the former name National Atomic Museum, will include cocktails, hors d'oeuvres and admission for the special preview event. For ticket information and other details, check the museum website at www.atomicmuseum.com. Questions to Marina Colon at 245-2137, extension 114, or mmcolon@sandia.gov.

* * *

The National Museum of Nuclear Science & History (formerly the National Atomic Museum) will host a bus tour to Trinity Site Saturday, April 4. The bus will leave the new museum (601 Eubank SE) at 6 a.m. and return around 4:30 p.m. Tour participants will walk to Ground Zero, see Jumbo and be able to enter the historic McDonald Ranch House. Docents will lecture on the bus and at the site about historical events, developments and scientific pioneers of the Manhattan Project. The tour includes lunch at New Mexico Tech and viewing of explosive tests at the university. Cost is $60 per person. For reservations, call 242-6083.

Sandia accredited as a 'trusted design' facility for integrated circuits

Sandia has received accreditation to provide "trusted design" services for both unclassified and classified integrated circuits at its Sandia/New Mexico facility.

Sandia's Category 1A status was awarded through the Trusted IC Supplier Accreditation Program (www.dmea.osd.mil/trustedic.html) of DoD's Defense MicroElectronics Activity (DMEA) (www.dmea.osd.mil/). The program is part of DoD's strategy to ensure that electronic components used in US military and national security applications are trustworthy. Certification is necessary because the increasing offshore migration of all sectors of the microelectronics industry comes at a time of increasing demand for high-performance, application-specific integrated circuits (ASICs) from military and national security agencies.

Sandia provides ASIC design services for both radiation-hardened and non-radiation-hardened trusted foundries. Design capability for 350 nanometers, 180 nm, 130 nm, and 90 nm technologies enables Sandia to work with most of the trusted foundries. This includes in-house design for mixed-signal, radiation-hardened, low-volume ASIC products. Other trusted foundries — among them IBM, National Semiconductor, Honeywell, and BAE Systems — provide access to leading-edge technologies for mixed-signal, high-performance and high-density system-on-chip (SoC) solutions.

In support of its primary mission as steward of the US nuclear stockpile, Sandia has developed and delivered digital and mixed-signal microelectronic products for nearly three decades. This expertise has also been applied to other national security needs including ensuring the nonproliferation of nuclear weapons and materials, reducing the threat from chemical and biological weapons, and providing advanced custom designs for other agencies like the DoD. Sandia's ASIC development team develops and maintains digital, analog, and mixed-signal design expertise along with deep understanding of technology offerings and design methodologies to provide custom microelectronic products and engineering services that fulfill needs of diverse customers.

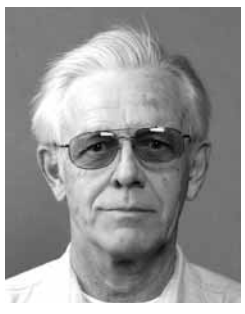
Sandia focuses on high-reliability custom solutions for high-consequence applications. An efficient and disciplined ISO 9001-certified design methodology enhances chances for first-pass silicon solutions. The Labs maintains a leading-edge design tool set. Combining ASIC solutions with other in-house capabilities in fabrication and packaging, along with test, failure analysis, and reliability, Sandia can offer a total integrated-circuit design solution.

For further information or questions email Trusted_ASIC@sandia.gov.

— Neal Singer

Mileposts

New Mexico photos by Michelle Fleming
California photos by Randy Wong



Donald Overmyer
40 1112

Larry Ruggles
40 1675

Recent Retirees

Mary Gonzales
33 2541

Elaine Boespflug
30 2735

Stephen Babicz
35 1735

Lorenzo Asia
30 8243

Doris Ellis
30 5200

T. J. Garner
30 2553

Robert Case
19 2913

Patricia Burkhart
14 8205

Arthur Pontau
30 8360

Mike Arms
25 6326

Gloria Christensen
25 8205

Joseph Damico
25 6723

Greg Elbring
25 6314

Jaime Gomez
25 5732

Rose Mary Gurule
25 10655

BJ Jones
25 3030

Guadalupe Massoth
25 9515

Dennis Morrison
25 8367

Alejandro Pimentel
25 1726

Danelle Tanner
25 1749

Steven Thornberg
25 1825

Michael Arviso
20 1522

Stephen Crowder
20 415

Raymond Griego
20 2112

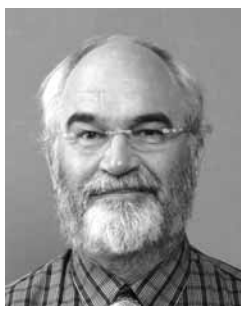
Michael Lanigan
20 3651

Steven Rezac
20 2114

Lothar Bieg
15 1732

Theresa Brown
15 6321

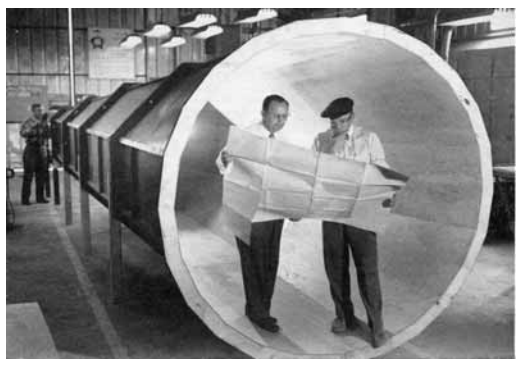
Scott Jones
15 5741



Michael Du Mond
15 4133

Heather Schriner
15 2913

50 years ago . . . Particle physics studies associated with fallout from nuclear reactions have resulted in a **special wind test chamber** being developed to evaluate instruments used in the work. Air samplers and fast response

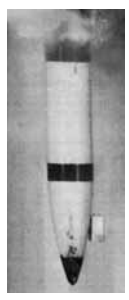


meteorological instruments will be tested and calibrated in the wooden wind test chamber.

40 years ago . . . Most thermal batteries are activated when a pyrotechnic mixture is fired by means of an impulse or signal. **A Sandia chemist has invented a self-actuating battery** which operates when a specific temperature is reached. Samuel Levy relies on the behavior of lead-tin and lithium, which melt and alloy when a temperature of 186°C (265°F) is reached. Heat generated by this action is sufficient to activate the thermal battery. The external heat can be from any source and can be applied at any rate.

SAMUEL LEVY (2343) displays a lithium, lead-tin generator that energizes a battery.

30 years ago . . . A prototype Pershing II earth penetrator was loaded into the the TTR Davis gun and fired point blank into the ground. It was a prototype of the proposed penetrator. The 400-lb. test unit was driven like a bullet 67.5 ft. deep into the compacted silt and cemented sand of the lake bed. Inside the steel case of the penetrator were simulated components of the weapon electrical system, a special telemetry package, and a mock-up LASL device. The Pershing II earth penetrator will be in a reentry vehicle which is delivered by a surface-to-surface missile fired from a mobile rocket launcher. The RV reaches apogee above the atmosphere, re-enters and impacts into the surface of the earth. The earth penetrator separates from the re-entry vehicle and penetrates some distance before detonating.



Pershing II penetrator leaving the muzzle of the Davis gun.

TTR DAVIS GUN is hydraulically lifted for loading.

Sandia retirees united through Coronado Thunderbirds

By Iris Aboytes

Are you a 50-plus retiree? If you are, you might be interested in the Coronado Thunderbirds, a retiree club associated with the Mountain View Club (MVC). Started at the Coronado Club in 1985, its purpose is to serve the social, recreational, and special interests of its members.

The club includes DOE/NNSA and Sandia retirees, members of the military and other federal agencies, and spouses. Typically about 100 Thunderbirds meet at the MVC monthly. Dues are $10 per person. The club currently has 300 members.

The MVC does not charge for use of the facility, but the Thunderbirds are required to become members. Dues vary from $7 to $15 per month depending on annual income. One MVC membership covers the family.

The MVC acts as sponsor for retirees without base access. Tony Bailey (846-5165) can help arrange sponsorships. Meetings are held the second Tuesday of every month starting at 1 p.m. Many members go early for lunch. "It's a great time for socializing and the food is excellent," says John Orman, Development Committee chairman. "A speaker or entertainer generally follows the meeting, and there's a drawing for three free lunches at the MVC. Cookies usually close the meeting."

The April 14 meeting will feature speakers from the Central New Mexico YMCA, who will describe the history and community service of the YMCA, as well as special Y programs like Silver Sneakers. This meeting is free for visitors.

Bridge every Thursday unites 36-52 members for bridge. The games begin at 9:30 a.m., with a break for lunch. Play ends by 2:30 p.m.

"As the Thunderbird travel chairman, retiree Bob Butler prepares short and long trips at unbeatable prices," says John. "Short trips by bus might include Laughlin/Las Vegas, the Ponderosa Winery, Cumbres & Toltec Railroad, Carlsbad Caverns, and the Pecos River of Lights. Plans are currently underway for an Alaskan cruise in May 2009 and a trip to northern New Mexico to visit the Salman Raspberry Ranch, an alpaca ranch, and the Pecos Ruins."

THUNDERBIRDS enjoy the view at Canyon de Chelly, Ariz., on a recent club-sponsored tour.

Speakers have talked about the use of defibrillators, sleep disorders, identity theft, and understanding nanotechnology. Tom Joles, coanchor of Eyewitness News 4 was the featured speaker in February. Entertainment has included a guitarist/singer from the former Lawrence Welk show and members of Baila! Baila!

Retiree Ellen Biernacki is in charge of entertainment. "She arranges special events, dinners, picnics, programs at Popejoy, and the Albuquerque Little Theater," says John. "She gets us excellent prices."

A bimonthly club newsletter keeps the members up to date on happenings.

"Where else can a person get to know friendly, helpful, vibrant people and have a great time doing it?" says John. "Check us out at http://coronado-tbirds.tripod.com, or contact Genelia Boenig at 836-6977."

Hello Dolly – Nice to have you back where you belong

A mud-caked wallet brings closure to Dolly Yoder

By Iris Aboytes

He walked into Sandra Rougemont's (12123) office in Bldg. 811 carrying a plastic bag. A leather wallet wearing a cover of caked earth and rotted grass was inside. It had obviously been uprooted from its place of residence. Inside, credit cards glued with mud were stacked together. To whom did they belong?

A Sandia identification card bearing the name of Dolly Yoder (10663) identified its owner. He wanted to make sure she got it.

"He" identified himself as a property owner from the east side of the mountain. He and his wife had been clearing a ravine to plant fruit trees. Under a dead willow lay a calculator, a compact, and blue hair combs. When they started digging, the wallet appeared. From its condition, it had obviously been buried beneath the willow for some time.

His first attempt to return the wallet to its rightful owner encountered a locked door. He had gone to the Pro Force building, but his DoD clearance did not permit him entry, so he came to Bldg. 811 — outside the tech area. "He told me he and his wife had found the wallet on their property," says Sandra. "Since it contained a Sandia identification card, he wanted to return it to its owner. I called Dolly, and she came to retrieve the wallet."


BURIED TREASURE — Wallet brings Dolly Yoder closure.

Eleven years ago, on a warm Sunday afternoon, Dolly had taken her two grandchildren, Hayley and Alec, ages six and three, to a children's movie on Central and Tramway. "After the movie was over, my grandchildren wanted to play the games in the lobby," says Dolly.

"When we walked out, there was no one in sight. I don't know why, but I got an eerie feeling. Walking to my car, I was holding my grandchildren's hands. Before we had reached the car, I was pushed from behind and knocked to the ground. I apparently hit my head and was unconscious for a second or two. When I awoke, a tall, muscular man had taken Alec. My purse was tangled around his body. I was able to get up and run after the thief. I ordered him to put my Alec down. Surprisingly, he did so gently, but he ran away with my purse. While this was happening, my terrified granddaughter found safety close to the car.

"My concern was for my grandchildren. After the incident, they had many sleepless nights.

"I cancelled all my credit cards," adds Dolly. "That was effective, although one of my gasoline credit cards was used once. The robber, of course, kept the $50 in my purse. The police were called and the crime was investigated, but the perpetrator, to my knowledge, was never found." Dolly is grateful to have her wallet back.

"They wouldn't accept a reward," she says. "They only wanted to do the right thing. They are very decent people."

The property owner's wife had also been a victim of a purse snatcher and understood what the wallet would mean to the owner.

So it is that this weather-beaten, muddy wallet, "provides me a means of closure," says Dolly. "I am very thankful to both of the owners."

Employee Car Show

An employee car show will be held concurrently with Family Day, May 16, 9 a.m. to 3 p.m. in the street just east of Hardin Field. All Sandia employee and contractor vehicles, including customs, restored vehicles, trucks, race cars, and motorcycles are welcome and will be accepted. There will be no judging, but entrants will receive a paper memento acknowledging their participation. Questions should be addressed to Reggie Tibbetts (4234) or Matt Torres (4211) at 844-5244. To enter, mail your entry to Reggie Tibbetts (MS1345) or email your entry to rftibbe@sandia.gov.

Registration deadline is May 11.

Entries must include:
- Name
- Org
- Mail stop
- Phone
- Vehicle year, make, and model